Finding position from displacement:

$$s(a) - s(o) = \int_0^a v(t)dt$$

$$s(a) = s(0) + \int_0^a v(t)dt$$

1. For the problems below, the function $v(t)$ is the velocity in m/sec of a particle moving along the x-axis. Use analytic methods to do each of the following:
   a. Determine when the particle is moving to the right, to the left, and stopped.
   b. Find the particle's displacement for the given time interval. If $s(0) = 3$, what is the particle's final position?
   c. Find the total distance traveled.
      i. $v(t) = 5\cos t, \quad 0 \le t \le 2\pi$

2. For the problems below, the function $v(t)$ is the velocity in m/sec of a particle moving along the x-axis. Use analytic methods to do each of the following:
   a. Find the particle's displacement for the given time interval. If $s(0) = 3$, what is the particle's final position?
   b. Find the total distance traveled.
      i. $v(t) = 49 - 9.8t, \quad 0 \le t \le 10$

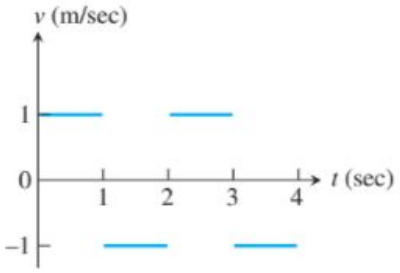
      ii. $v(t) = \sqrt{4 - t}, \quad 0 \le t \le 4$

3. An automobile accelerates from rest at $1 + 3\sqrt{t}$ mph/sec for 9 seconds.
   a. What is its velocity after 9 seconds?

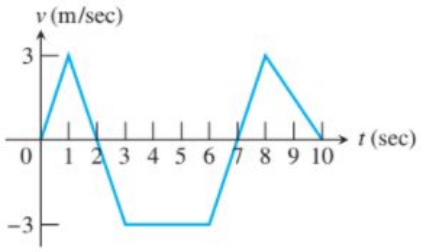
   b. How far does it travel in those 9 seconds?

4. The graph of the velocity of a particle moving on the x-axis is given. The particle starts at $x = 2$ when $t = 0$.
   a. Find where the particle is at the end of the trip.
   b. Find the total distance traveled by the particle.

      i.



ii.



4. The rate at which your home consumes electricity is measured in kilowatts. If your home consumes electricity at the rate of 1 kilowatt for 1 hour, you will be charged for 1 "kilowatt-hour" of electricity. Suppose that the average consumption rate for a certain home is modeled by the function $C(t) = 3.9 - 2.4\sin(\frac{\pi t}{12})$, where $C(t)$ is measured in kilowatts and t is the number of hours past midnight. Find the average daily consumption of this home measured in kilowatt-hours.

5. Midday traffic through an intersection can be modeled by the function $74 + 6\cos(\frac{t}{3})$ cars per minutes, where t is measured in minutes after noon. Find the number of cars that pass through this intersection between non and 12:30 p.m.